

# Notice of Allowability

Application No.

10/698,558

Examiner

Tony Lu

Applicant(s)

DRIES ET AL.

Art Unit

2878

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to amendment filed on 1/09/2006.
2. ☒ The allowed claim(s) is/are 1-6, 8-17 and 19-22.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  - a) ☐ All    b) ☐ Some\*    c) ☐ None    of the:
  1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

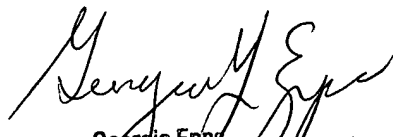
\* Certified copies not received: \_\_\_\_\_.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.  
**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
  5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
    - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
      - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date \_\_\_\_\_.
    - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

## Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08),  
Paper No./Mail Date \_\_\_\_\_
4. ☐ Examiner's Comment Regarding Requirement for Deposit  
of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☒ Interview Summary (PTO-413),  
Paper No./Mail Date 3/17/06.
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other \_\_\_\_\_

  
Georgia Epps  
Supervisory Patent Examiner

## **DETAILED ACTION**

### **EXAMINER'S AMENDMENT**

An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Peter Malen on 3/17/2006.

The application has been amended as follows:

Claim 1 should read:

1. A fiber-optic transceiver for use in optical communications where the fiber-optic transceiver may receive optical signals of varying powers, the fiber-optic transceiver comprising:
  - an avalanche photodiode comprising:
    - a gain layer;
    - an absorption layer; and
    - a field control layer disposed between the gain layer and the absorption layer, the field control layer having a doping thickness product that determines a dynamic range and is a product of a density of a dopant and a thickness of the field control layer;
    - a power supply that supplies a range of bias voltages to the avalanche photodiode, wherein the doping thickness product of the field control layer causes the avalanche photodiode to operate in an avalanche region when biased by a bias voltage in the range of bias voltages and wherein ~~lowering the doping~~

~~thickness product lowers a punch-through voltage and raises a breakdown voltage to increase the dynamic range; a relation between the doping thickness product and an avalanche photodiode punch through voltage, breakdown voltage and dynamic range is such that for a first doping thickness product that is less than a second doping thickness product:~~

a punch through voltage associated with the first doping thickness product is relatively lower than a punch through voltage associated with the second doping thickness product;

a breakdown voltage associated with the first doping thickness product is relatively greater than a breakdown voltage associated with the second doping thickness product; and

a dynamic range associated with the first doping thickness product is relatively greater than a dynamic range associated with the second doping thickness product; and

a feedback mechanism that controls the bias voltage in response to the current through the avalanche photodiode.

Claim 21 should read:

21. A fiber-optic transceiver for use in optical communications where the fiber-optic transceiver may receive optical signals of varying powers, the fiber-optic transceiver comprising:
- an avalanche photodiode comprising:
    - a gain layer;
    - an absorption layer; and

a field control layer disposed between the gain layer and the absorption layer, the field control layer having a doping thickness product that determines a dynamic range and is a product of a density of a dopant and a thickness of the field control layer;

a power supply that supplies a range of bias voltages to the avalanche photodiode, wherein the doping thickness product of the field control layer causes the avalanche photodiode to operate in an avalanche region when biased by a bias voltage in the range of bias voltages ~~such that adjusting the doping thickness product adjusts a punch-through voltage and a breakdown voltage to cause an adjustment in the dynamic range or a peak sensitivity and a~~ variation in the doping thickness product corresponds with a variation in a punch through voltage and in a breakdown voltage, and the variation in the punch through voltage and the breakdown voltage corresponding with a variation in the dynamic range or in a peak sensitivity; and

a feedback mechanism that controls the bias voltage in response to the current through the avalanche photodiode.

### ***Conclusion***

#### ***Allowable Subject Matter***

Claims 1-6, 8-17 and 19-22 are allowed.

The following is an examiner's statement of reasons for allowance:

The prior art fails to teach an optical receiver and its method steps, among other features, comprising: an avalanche comprising: a gain layer; an absorption layer; and a field control layer, having a doping thickness product that determines a dynamic range and is a product of a density of a dopant and a thickness of the field control layer,


disposed in between the gain layer and the absorption layer; a power supply for supplying a range of bias voltages to the avalanche photodiode wherein the doping thickness product of the field control layer causes the avalanche photodiode to operate in an avalanche region when biased by the range of bias voltages and a relation between the doping thickness product and an avalanche photodiode punch through voltage, breakdown voltage and dynamic range is that for a first doping thickness product that is less than a second doping product thickness product: a punch through voltage, a breakdown voltage and a dynamic range associated with the first doping thickness product are lower than a punch through voltage, greater than a breakdown voltage and greater than a dynamic range associated with the second doping thickness product respectively; and a feedback mechanism for controlling the bias voltage in response to a current through the avalanche photodiode.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tony Lu whose telephone number is 5712728448. The examiner can normally be reached on M-F 9:00am- 6:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Georgia Epps can be reached on 5712722328. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in cursive script, appearing to read "L. J. Taylor".A handwritten signature in cursive script, appearing to read "Georgia Epps".

Georgia Epps  
Supervisory Patent Examiner  
Technology Center 2800